

**USDA**  
**NATURAL RESOURCES**  
**CONSERVATION SERVICE**  
  
**MARYLAND CONSERVATION**  
**PRACTICE STANDARD**  
  
**PIPELINE**  
  
**CODE 516**  
**(Reported by Ft.)**

### **DEFINITION**

Pipeline having an inside diameter of 8 inches or less.

### **PURPOSE**

To convey water from a source of supply to points of use for livestock, wildlife, or recreation.

### **CONDITIONS WHERE PRACTICE APPLIES**

Where it is desirable or necessary to convey water in a closed conduit from one point to another.

### **CONSIDERATIONS**

#### **Water Quantity**

1. Effects on components of the water budget;
2. Effects on downstream flows or aquifers that affect other water uses or users.

#### **Water Quality**

1. Effects on erosion and movement of sediment, pathogens, and soluble and sediment-attached substances carried by runoff;
2. Effects on the visual quality of onsite and downstream water resources;

3. Effects on wetlands and water-related wildlife habitats.

Consider the visual design of pipelines and appurtenances in areas of high public visibility

### **CRITERIA**

#### **Design**

**Capacity** - For supplying livestock water, provide the quantity as needed. Refer to the Maryland conservation practice standard for Watering Facility (Code 614) for recommended daily rates.

For recreation areas, provide the capacity needed for all planned uses of the water, such as drinking, fire protection, showers, flush toilets, and irrigation of landscaped areas.

**Sanitary Protection** - If water from the pipeline is to be used for human consumption, or for use in a dairy facility, or when connecting to a potable water system, the requirements of the state health department for materials and installation must be met. Install pressurized systems in accordance with local regulations. Permits may be required for the installation of these systems. Contact the Permits Division of the local county government for regulations and permit requirements.

**Size** - For pressurized systems, size the pipeline based on the desired water needs, site conditions, and type of pipe. Use a minimum size of ¾-inch inside diameter.

For gravity flow systems with a working head that is less than 20 feet, use a minimum 2-inch inside diameter.

**Pipe** - All pipe must withstand the pressure it will be subjected to, including hydraulic transients, internal pressures, and external pressures. As a safety factor against surge or water hammer, the working pressure should not exceed 72% of the pressure rating of the pipe, and the design flow velocity at system capacity should not exceed 5 ft/sec. If either of these limits is exceeded, special consideration must be given to flow conditions, and measures must be taken to

Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resources Conservation Service.

adequately protect the pipeline against surge.

For gravity flow systems with a working head pressure meeting or exceeding 20 feet, the requirements of a pressurized system must be met.

**Drainage** - When possible, provide a method of draining the pipeline as needed for maintenance. This drain should be located to allow for draining the trough, when applicable.

**Vents** - Provide for entry and removal of air along the pipeline, as needed, to prevent air locking or pipe collapse. If parts of the line are above the hydraulic gradient, periodic use of an air pump may be required. Make provisions for pressure relief, air relief and vacuum relief as needed to protect the pipeline.

**Joints** - Use watertight joints with strength equal to that of the pipe. Couplings must be of material compatible with that of the pipe. If they are made of material susceptible to corrosion, provisions must be made to protect them.

**Protection** - When using steel pipe installed above ground, use galvanized pipe or protect with a suitable protective paint coating, including a primer coat and two or more final coats.

Use ultraviolet light-resistant plastic pipe when plastic pipe is installed above ground.

Protect all pipes, valves and other appurtenances from hazards presented by traffic, farm operations, freezing temperatures, fire, and thermal expansion and contraction. Reasonable measures shall be taken to protect the pipe from potential vandalism.

### **Vegetation**

Follow the Maryland conservation practice standard for Critical Area Planting (Code 342) to determine the appropriate grass species to be established, based on site conditions and use.

### **Materials**

**Gravel** - Crushed rock or gravel shall be compliant with gradations and quality found in the Maryland Department of Transportation, State Highway Administration, Standard Specifications for Construction and Materials, Section 901.

**Steel Pipe** - Steel pipe shall meet the requirements specified in AWWA Specification C-200. If because of local conditions, a coal-tar enamel protective coating is needed for steel pipe, the coating shall meet the requirements of AWWA Specification C-203.

**Plastic Pressure Pipe and Fittings** - Use plastic pressure pipe that is suitable for underground use. Meet the requirements of the following ASTM specifications:

1. D 1527 Acrylonitrile- Butadiene- Styrene (ABS) Plastic Pipe, Schedule 40 and 80;
2. D 1785 Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120;
3. D 2104 Polyethylene (PE) Plastic Pipe, Schedule 40;
4. D 2239 Polyethylene (PE) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter;
5. D 2241 Poly (Vinyl Chloride) PVC) Pressure-Rated Pipe (SDR);
6. D 2282 Acrylonitrile- Butadiene- Styrene (ABS) Plastic Pipe (SDR-PR);
7. D 2447 Polyethylene (PE) Plastic Pipe, Schedules 40 and 80, Based on Outside Diameter;
8. D 2513 Thermoplastic Gas Pressure Pipe, Tubing and Fitting;
9. D 2672 Joints for IPS PVC Using Solvent Cement;
10. D 2737 Polyethylene (PE) Plastic Tubing;
11. D 3035 Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter;
12. AWWA C900 Polyvinyl Chloride (PVC) Pressure Pipe, 4 inches through 12 inches;
13. AWWA C901 Polyethylene (PE) Pressure Pipe and Tubing, ½ inch through 3 inches.

Plastic Pressure Pipe fittings shall conform to the requirements of the following ASTM specifications:

1. D 2464 Threaded Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80;
2. D 2466 Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40;
3. D 2467 Socket-Type Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80;
4. D 2468 Acrylonitrile- Butadiene- Styrene (ABS) Plastic Pipe Fittings, Schedule 40;
5. D 2609 Plastic Insert Fittings for Polyethylene (PE) Plastic Pipe;
6. D 2683 Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing;
7. D 3139 Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals;
8. D 3261 Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing.

**Plastic Pipe for Gravity Systems** – Use plastic pipe for gravity (non-pressure) flow systems suitable for underground use. Plastic pipes meeting the requirements for pressure pipe and fittings may be used. Plastic pipe and joints meeting the requirements of the following ASTM specifications may also be used:

1. D 2665 Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent (dwv) Pipe and Fittings. Note: Fittings under this designation may not be stamped with the ASTM designation D 2665. They will be marked NSF-dwv;
2. D 2729 Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings;
3. D 3033 Type PSP Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings;
4. D 3034 Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings;

5. F 891 Coextruded Poly (Vinyl Chloride) (PVC) Plastic Pipe With a Cellular Core. Joints for this pipe shall meet the requirements of D 2665, D 2729, or D 3034 depending on pipe series.

**Solvents** - Solvents for all solvent-welded plastic pipe joints shall conform to the following ASTM specifications, as applicable:

1. D 2235 Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings;
2. D 2564 Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems;
3. D 2855 Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings.

**Gaskets** - Rubber gaskets for all plastic pipe joints shall conform to the requirements of the following ASTM specification:

1. F 477, Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

## **SPECIFICATIONS**

Plans and specifications for installing pipelines shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose. If the pipeline is a component of a system that includes additional conservation practices, the information necessary to construct these additional practices will also be conveyed on the plans.

### **Placement**

Install pipelines so that they are protected against hazards imposed by traffic, farm operations, freezing temperatures, or soil cracking. Other means of protection must be provided if the depth required for protection is impracticable because of shallow soils over rock or for other reasons. Abrupt changes in grade must be avoided to prevent rupture of the pipe.

Trenches for plastic pipelines shall be free of rocks and other sharp-edged materials. Carefully place the pipe to prevent damage. Initial backfill shall be of selected material that is free of rocks or other sharp-edged material that can damage the pipe. Deformation or displacement of the pipe must not occur during backfilling.

Plastic pipelines may be placed by plow-in equipment if soils are suitable and rocks and boulders will not damage the pipe. Plastic pipelines installed by the plow-in method require surface compaction and shaping in addition to the normal plow-in operations.

### **Testing**

Test the pipeline for leaks by filling the pipe with water at the design working head or by testing at the working pressure. Repair leaks as needed.

## **OPERATION AND MAINTENANCE**

Provide to the landowner an O & M plan specific to the type of installed pipeline. The plan shall include, but not be limited to, the following provisions:

1. Inspect collection and storage devices, valves, outlets and pipelines at least twice per year. Make repairs as needed;
2. Check for debris, algae, sludge or other materials in the system, which may restrict the inflow or outflow system, and remove;
3. Prepare guidance for winter weather operation, such as cleaning and discontinuing use, or providing for frost-free use;
4. Protect from damage due to livestock and farm equipment. Maintain fences and other devices used for this purpose;
5. Check for leaks and repair immediately;
6. Check valves, automatic water level devices, and overflow pipes for proper operation;
7. Chemical may be added to the system for algae and other water quality issues when in accordance with local rules and regulations;
8. Maintain vegetative cover around the system. Mow at least yearly. Provide weed control as needed. Reseed, lime, and fertilize area as needed.

## **SUPPORTING DATA AND DOCUMENTATION**

### **Field Data and Survey Notes**

The following is a list of the minimum data needed:

1. System plan sketch;
2. Profile along centerline of proposed pipe from source to outlet;
3. Special control or field feature that must be considered in design.

### **Design Data**

Record on appropriate engineering paper. For guidance on the preparation of engineering plans see Chapter 5 of the Engineering Field Handbook, Part 650. The following is a list of the minimum required design data:

1. Plan view including all system components and construction specifications;
2. Profile of system shown on the plans;
3. Determine slope of pipeline and difference in elevation between source or collection box inlet and tank overflow, record on plan;
4. Complete pipeline design using methods described in Chapters 12, 14 or 15 from the EFH, Part 650, as applicable;
5. Dimensions and type of cutoff wall, if applicable shown on the plans;
6. Select type and dimensions for spring box and show on the plans;
7. Show type and size of pipeline system on profile;
8. Size and type of stabilization treatment around facility shown on the plans;
9. Job Class on plan;
10. Quantities estimate;
11. Planting plan. This must meet the criteria, specifications, and documentation require-

ments of the Maryland conservation practice standard, Critical Area Planting, Code 342.

12. Written Operation and Maintenance Plan.

### **Construction Check Data**

Record on survey note paper, SCS-ENG-28, or other appropriate engineering paper. Survey data will be plotted on plans in red. The following is a list of minimum data needed for As-builts:

1. Documentation of site visits on CPA-6. Include the date, who performed the inspection, specifics as to what was inspected, all alternatives discussed, and decisions made and by whom;
2. Elevations of control features;
3. Dimensions of pipelines, hydrants, spring box, collection system, trough and other components;
4. Statement on seeding and fencing;
5. Final quantities and documentation for quantity changes. Materials certification;
6. Sign and date check notes and plans by a person with appropriate approval authority. Include statement that practice meets or exceeds plans and NRCS practice standards.

## **REFERENCES**

1. American Society for Testing and Materials, *ASTM Standards*, Philadelphia, Pennsylvania.
2. American Water Works Association, *AWWA Standards*, Denver, Colorado.
3. Maryland Department of Transportation, State Highway Administration, January 2001. *Standard Specifications for Construction and Materials*.
4. USDA, Natural Resources Conservation Service, *Maryland Field Office Technical Guide, Section IV, Standards and Specifications*.
5. USDA, Natural Resources Conservation Service, *National Engineering Handbook, Part 650*.